

Original Communication

Suicides in Northern India: Comparison of trends and review of literature

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Abstract

Trends of suicide vary widely according to time, region, age group, sex, and race. Despite mixed trends of increases or decreases in suicide rates around the world, suicide remains an important public-health problem. In an effort to understand and prevent suicide, researchers have investigated medical, psychosocial, cultural, and socio-economic risk factors associated with the environment as a promising line of research. There is now considerable evidence that childhood and family adversities in general such as childhood sexual and physical abuse, witnessing domestic violence, parental separation or divorce and living with substance abusing, mentally ill or criminal family members may be both strongly interrelated and individually related to suicidal behavior in adolescents as well as adults. The approach towards prevention of suicide has to be multidisciplinary. To recognize that adverse childhood experiences that frequently take place as multiple events, identifying and treating those young people who have been exposed to such experiences, promoting increased awareness among parents, teachers, and health professionals of the important role that severe interpersonal difficulties and dysfunctional cognitions can play in the development of suicidal behavior in young people, and helping parents modify their maladaptive child-rearing behavior could help. Child and family support programs, employment support for mothers, and legal guarantees of gender equality, could moderate problems of socio-economic disparity and poverty, which predicts both parents' and children's suicidal behaviors in modern societies.

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1. Introduction

Suicide is a recognized major public-health problem, worldwide. It is related to a number of risk factors like psychiatric disorders and psychological, social and biological factors. Death as a result of self-inflicted injuries has been reported to account for 1.5% of total deaths among all

sexes, and ranked within the leading two causes of death among 15–34-year-old people in a selection of European countries and China, and is the 10th leading cause of death worldwide.¹ A recent study from China estimated that 3.6% of all deaths in China are due to suicide.² However, among the seven countries with population over 100 million, from which data are available, the age-standardized suicide rates over specific time periods, have been reported to vary widely.³ Given the public health impact of this problem, it becomes essential to gather information on mortality from suicide in various countries.

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With reference to trends in rates, in the 1970s and 1980s, suicide rates moved upwards in elderly men from North America and in younger men in Japan and several European countries, but were generally more stable for women. Furthermore, there were substantial (over 10-fold) differences in rates, between the highest ones from Hungary, Finland, Denmark, the former Soviet Union and Sri Lanka, and the lowest ones in South America or southern Europe.⁴ Overall age-adjusted (on the world standard population) male mortality rates from suicide in Hungary or Sri Lanka were of the order of 50/100,000, i.e. higher than cardiovascular mortality rates in Japan or France.⁵ However, the aggregate figures are said to hide variations that have occurred among sexes, age groups and regions.⁶ In order to assess the actual magnitude of the problem and to plan effective steps to counter it, research should be conducted to plot the changing trends in mortality from suicide in different countries and to correlate these to risk and protective factors. The changing trends over the years should be analyzed keeping in perspective the psychosocial, economic and political factors involved and the availability of policies, programs or services to tackle the problem.

With reference to trends in suicides among the young, substantial rises were observed in the 1980s in several European countries, including the UK,⁷ Spain,⁸ Italy,^{9,10} Japan, Australia and New Zealand.^{11–13} These upward trends in younger males have now tended to level off in several countries, or to decline in other, such as Sweden¹⁴ and Japan. However, substantial upward trends in suicide rates were still present over the most recent calendar periods in Ireland, as well as Australia and New Zealand, with rates of the order of 35–45/100,000, calling therefore for urgent intervention.¹⁵ In Russia and other countries from the former Soviet Union,¹⁶ suicide mortality rates rose over the last decade by about 10% for females, and by over 50% for males. Of even greater importance is the still increasing rate of suicide in young women and, mostly, young men in Russia, whose rates have been reported 66/100,000 men aged 15–34 years. Available data from approximately 10% of the population of China show an overall suicide rate around 23/100,000, with higher rates for women and in rural areas.²

The reasons for these rises are likely to be complex, but are likely to include widespread alcohol abuse.^{17–19} The patterns and trends observed are, to some extent, influenced by changes in identification and classification. It is also known that a variable proportion of suicidal deaths can be attributed to other (violent) causes of death in various countries and calendar periods.^{2,15} Notwithstanding the bias and errors, prevalence of psychiatric conditions, mainly depression and alcohol use disorders and their management, may have influence on national suicide rates.^{20–24} In addition, the major determinants of the substantial variation in suicide rates across geographical areas and calendar periods should be sought in economic, socio-cultural features and characteristics (including deprivation and unemployment), but also other risk factor exposures of

various populations.^{25–31} Some of the favorable trends in middle age and elderly individuals of both sexes, but mainly women, in several countries may be due to changes in the management of depression and other major psychiatric disorders, or to improved social networking. A role may have been played also by reduced availability of methods of suicide, including gas detoxification and the introduction of catalytic converters.^{11,32} It is almost impossible, however, to find a common cause for all the different trends across regions and countries, but certain factors like religion, socio-economic instability, poverty and unemployment, easy access to means of committing suicide, individualistic vs. collectivistic orientation, mental disorders and substance use disorders are those commonly implicated.

Although socio-economic instability is associated with an increase in suicide rate but this is not always true.³³ Unemployment and financial loss seem to have an unfavorable effect on suicide rate in some countries.^{29,34–36} Results from countries like India, Sri Lanka, China and USA, show that availability of insecticides and guns have been increasingly associated with increased suicide rates.^{37,2,3} Among mental disorders, depression is said to be associated with the highest risk of suicide.³⁸ Researchers believe that both depression and suicidal behavior can be linked to decreased serotonin in the brain. Low levels of a serotonin metabolite, 5-HIAA, have been detected in cerebral spinal fluid in persons who have attempted suicide, as well as by postmortem studies examining certain brain regions of suicide victims. It has been reported that serotonin receptors in the brain increase their activity in persons with major depression and suicidality, which explains why medications that desensitize or down-regulate these receptors (such as the serotonin reuptake inhibitors) have been found effective in treating depression. Among substance use disorders, alcohol abuse has been linked with increased suicide rates.^{39–41} We examined the trends of completed suicides in Northern India over a period of ten years.

2. Materials and methodology

This retrospective study was conducted at the department of Forensic Medicine, Government Medical College and Hospital, Chandigarh, a tertiary care center for the union territory and referral center for the adjoining states of Punjab, Haryana and Himachal Pradesh. The material for the present study comprised of 3178 cases of unnatural deaths subjected to medicolegal autopsy during the period from January 1996 to December 2005. (A medicolegal autopsy is mandatory in this region for all unnatural deaths irrespective of the death being accidental, suicidal or homicidal.) Data on relevant factors were collected from various sources, mainly case papers/hospital records, inquest papers and information furnished by the relatives of the deceased and the police at the time of autopsy. The results of 1421 cases, where the manner of death as alleged at the time of autopsy or confirmed by the investigating agency,

was suicide, were analyzed to find the prevalence and trends of suicide in this region. Cases (1757), where the manner of death was accidental or homicidal were excluded from the study.

To examine the relation between economical status and suicide we classified the socioeconomic groups into high-income group (earning Indian National Rupees (INR) 50,000 and above per person per month), middle-income group (INR 25,000–50,000), average-income group (INR 10,000–25,000), low-income group (less than INR 10,000) and very low-income group (poor) (less than INR 3000). It needs to be specified here that 1 US Dollar is approximately equivalent to 45 INR and 1 Euro is equivalent to 40 INR. We also attempted to examine the precipitating factors underlying the suicides by analyzing the alleged history incorporated in the autopsy reports.

3. Results

Out of a total number of 3178 medicolegal autopsies conducted during the period of study, 1109 (35%) unnatural deaths were due to road traffic accidents, 712 (22%) due to poisoning, 617 (19%) due to burns, 117 (4%) due to hanging, and 623 (19%) due to other causes that included include industrial accidents, accidental falls, snake bite,

electrocution, death due to extreme climatic conditions, etc., and sudden deaths arousing suspicion about the cause of death but confirmed due to disease on autopsy (Table 1).

Of the 1421 suicides, 669 (47%) were committed by consumption of poison, 561 (39%) by self-immolation and 117 (8%) by hanging, while 74 (5%) cases used other means like drowning, jumping from a height or firearms. There was a persistent increase in the percentage of suicides from 34% in 1996 to 49% in 2005 (Table 2). Among the poisons consumed for committing suicide aluminium phosphide accounted for 342 deaths, organophosphorus and organochloro compounds for 149 cases, other agrochemicals like paraquat and weedicides for 73 cases, whereas in 36 cases the reports did not reveal the nature of poison consumed (Fig. 1).

Maximum number of cases belonged to the age group of 21–25 years 442 (31%), followed by the age group of 26–30 years 309 (22%) and 16–20 years 242 (17%). Minimum number of suicide victims belonged to the age group of 1–15 years 14 (1%), followed by the age group above 60 years 25 (2%). Poison consumption was the preferred method of ending one's own life among the males, the male:female ratio being 2:1, while self immolation was preferred by the females, the male:female ratio being 1:4.5 (Table 3).

Table 1
Modes of various unnatural deaths

Mode of death	Total autopsies		Accidental		Suicidal		Homicidal	
	No.	%	No.	%	No.	%	No.	%
Road traffic accidents	1109	34.90	1109	64.48	00	00.00	00	00.00
Poisoning	712	22.40	41	02.38	669	47.08	02	05.41
Burns	617	19.42	55	03.20	561	39.48	01	02.70
Hanging	117	03.68	00	00.00	117	08.23	00	00.00
Others ^a	623	19.60	515	29.94	74	05.21	34	91.89
Total	3178	100	1720	100	1421	100	37	100

^a Others include industrial accidents, accidental falls, snake bite, electrocution, death due to extreme climatic conditions, etc., and sudden deaths arousing suspicion about the cause of death but confirmed due to disease on autopsy.

Table 2
Preferred methods and percentage of suicides

Year	Total autopsies	Suicides		Methods of suicides							
				Poisoning		Burns		Hanging		Others ^a	
		No.	%	No.	%	No.	%	No.	%	No.	%
1996	226	76	33.63	38	16.81	31	13.72	05	2.21	07	0.88
1997	264	93	35.23	44	16.67	37	14.02	10	3.79	07	0.76
1998	287	103	35.89	48	16.72	44	15.33	09	3.14	09	0.70
1999	303	130	42.90	54	17.82	55	19.80	13	4.29	08	0.99
2000	352	145	41.19	63	17.90	61	18.75	14	3.98	07	0.57
2001	372	201	54.03	96	25.81	73	23.12	17	4.57	10	0.54
2002	288	170	59.03	84	29.17	62	25.00	11	3.82	06	1.04
2003	338	147	43.49	67	19.82	63	18.64	15	4.44	08	0.59
2004	369	170	46.07	88	23.85	66	18.97	08	2.17	05	1.08
2005	379	186	49.08	87	22.96	69	2.14	15	3.96	07	0.79
Total	3178	1421	44.71	669	21.05	561	17.65	117	3.68	74	2.33

^a Others: drowning, jumping from a building, use of firearms, etc.

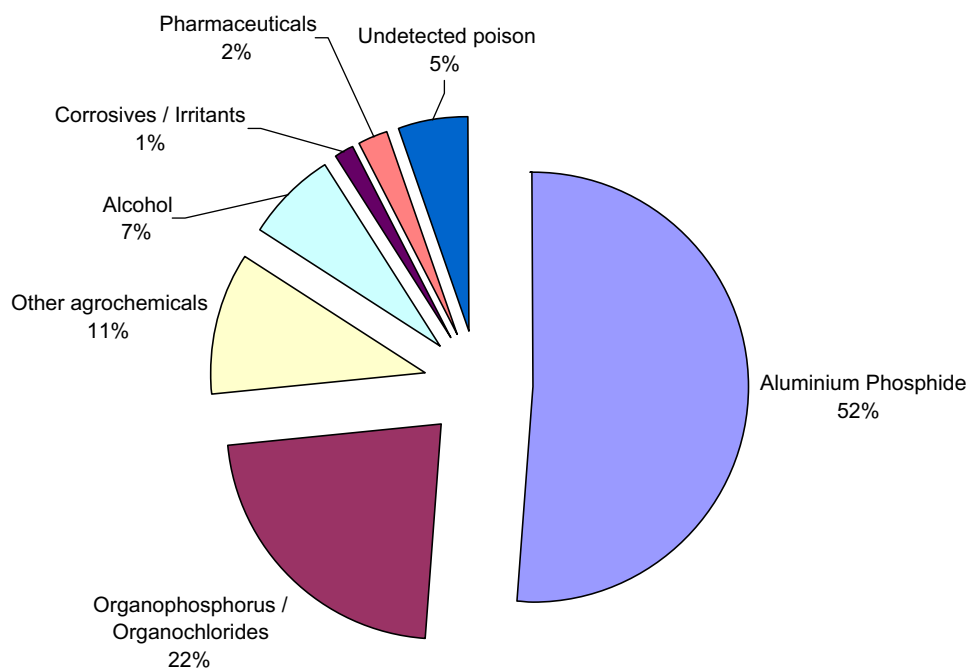


Fig. 1. Types of poison consumed.

Table 3
Age and gender distribution of suicides

Age group in years	Methods of suicide													
	Poisoning (<i>n</i> = 669)				Burns (<i>n</i> = 561)				Hanging and others (<i>n</i> = 191)				Total	
	Male		Female		Male		Female		Male		Female			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
01–15	04	00.92	00	00.00	00	00.00	02	00.43	06	04.38	02	03.70	14	00.98
16–20	73	16.94	58	24.37	15	15.63	79	16.98	10	07.30	07	12.96	242	17.03
21–25	122	28.31	77	32.35	36	37.50	146	31.40	48	35.04	13	24.08	442	31.11
26–30	82	19.03	35	14.71	18	18.75	134	28.82	29	21.17	11	20.37	309	21.75
31–40	71	16.47	34	14.29	14	14.58	69	14.84	23	16.79	08	14.81	219	15.41
41–50	48	11.14	18	07.56	07	07.29	16	03.44	11	08.03	07	12.96	107	07.53
51–60	26	06.03	13	05.46	04	04.17	10	02.15	07	05.11	03	05.56	63	04.43
>60	05	01.16	03	01.26	02	02.08	09	01.94	03	02.18	03	05.56	25	01.76
Total	431	100	238	100	96	100	465	100	137	100	54	100	1421	100

Seven hundred and thirty-four (51.65%), cases belonged to the low-income group with an income of less than 10,000 INR per month, whereas 549 (38.63%) belonged to the average-income group having a monthly income of 10,000–25,000 INR. The least number of cases were from the high and the middle-income group 37, and 33, respectively. Surprisingly, the suicide rate was found to be significantly low, 4.79% only among the very low-income group (poor) having a monthly income of less than 3000 INR (Fig. 2).

Among the underlying causes for suicide, social difficulties accounted for 35%, followed by the reasons like guilt and shame in 27%, while substance abuse was found in 7% of the cases (Table 4).

4. Discussion

Suicide rates vary widely according to time, region, age group, sex, and race. According to a study from Southern India,⁴² 15–19-year-olds resulted in average suicide rates of 148 per 100,000 for girls and 58 per 100,000 for boys. These suicide rates are about 50–70 times higher for girls and about four times higher for boys than the rates in the USA and UK.^{43,44} Suicide as the leading cause of death in this age group is in conformity with our observations from northern India. However, it is possible that the legal consequences of criminal charges for a suicidal act, societal stigma, and collection of suicide data by the police rather than an independent coroner might contribute to

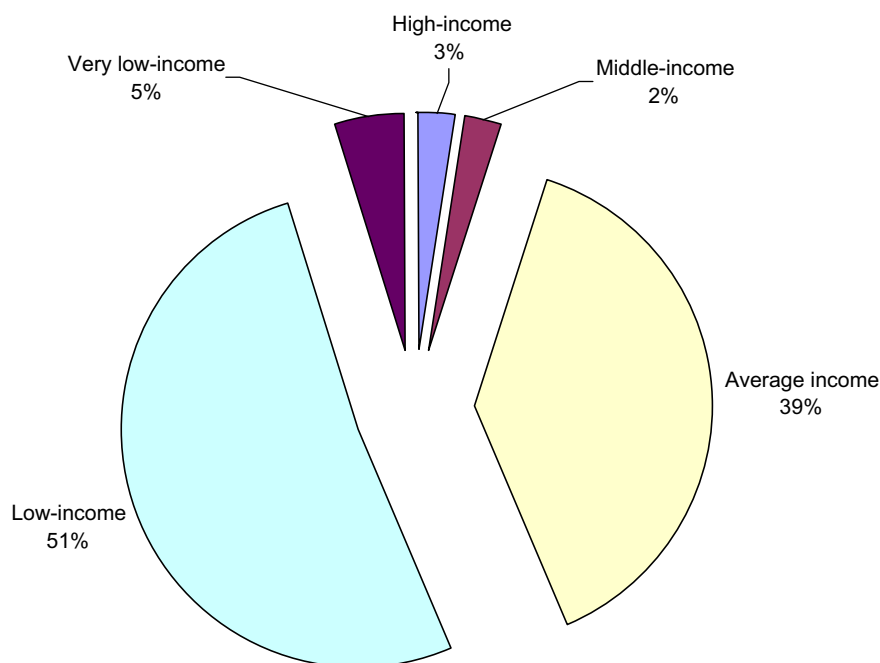


Fig. 2. Socioeconomic status of suicides.

under-reporting of suicide in India, as might occur in other countries.⁴⁵ However, caution is needed about possible overidentification of suicides because of the research interest in ascertainment and classification of death by suicide.

Global suicide rates have been fluctuating over recent decades, decreasing in developed countries such as the USA, countries in the European Union, and Japan, and increasing in eastern Europe, especially in Russia and countries of the former Soviet Union, Sri Lanka, and China.^{2,15} What appears to be common in the countries that had increasing suicide rates is the socio-cultural upheaval brought about by changes in the political and economic system leading to free markets and open society. One striking aspect of the suicide rates in our study, is a higher suicide rate in girls (757) than boys (664), which has also been observed in China and Singapore.^{2,43} The question of whether the politico-economical and socio-cultural upheaval affects the younger population, especially girls, more than other groups merits further study. However, one can surmise that intergenerational and gender conflicts are more intense in a traditional agricultural society transforming into an egalitarian industrial society than in stable developed countries.

A report⁴⁶ from Sri Lanka, which has the highest national suicide rate in the world, described possible reasons for high suicide rates: conflicts between collectivism and individualism, rigid hierarchical structure, repressive education, and influence of foreign culture through cinema and television. Additionally, the influence of the deeply rooted religious belief of Hindus and Buddhists in rebirth and karma (i.e., not regarding death as the final step) and self-sacrifice cannot be overlooked as a potential contributing factor to the high suicide rates in Sri Lanka as

well as India. Self-immolation (465 females in our study), exclusively used by recently married, Indian females, might be indicative of such cultural and religious factors.⁴⁷

The choice of a specific method takes place at the very end of the suicide process and availability is a major factor affecting this choice. Hanging is universally available and it is the most common method of suicide globally. In many places, the ready access to firearms makes them potentially dangerous, especially among male adolescents and young adults. Domestic gas has been reported as a frequently used suicide method. North India being agriculture based region, agrochemicals are easily available and therefore, responsible for maximum number of suicides particularly among the males.³⁷ Preference for self-immolation among the females can be attributed to age-old religious significance attached to the fire among the Hindus (prayers and marriages before the flames and even cremation by subjecting to flames).⁴⁷

Depression and substance abuse are well-established risk factors for suicide in both adults and adolescents. The same risk factors were also recognized in India,^{48,49} and China.⁵⁰ However, practice guidelines designed for specialists, such as child and adolescent psychiatrists, to assess and treat risk factors (e.g., depression) would not be practicable in developing countries. Ganju⁵¹ reported that there are about 1500 psychiatrists and 500 clinical psychologists in India, where the population is over a billion. Access problems of children and adolescents with a psychiatric illness to a specially trained child and adolescent psychiatrist have been well documented, even in the USA.⁵² Promotion of training and education of qualified mental-health professionals, including child and adolescent psychiatrists, is justified considering the size of the public-health

Table 4
Underlying causes for suicide

Precipitating factor	No.	%
<i>Social Difficulties</i> : friction with spouse or family, tensions at the place of work especially with the superiors, job instability, financial dependency, etc.	497	34.98
<i>Guilt and shame</i> : engendered in betrayal of a trust, involvement in an extramarital affair, failure in exams, or public humiliation, such as arrest and conviction for crime	382	26.88
<i>Recent loss</i> : bereavement due to death of loved person, separation from one's children after divorce, the break up of a love affair, etc.	193	13.58
<i>Fear</i> : caused by real or imagined threats to life as might come from suffering diseases with fatal prognoses or mental disorders or when an undesirable pregnancy occurs	98	06.90
<i>Pain</i> : unrelenting anguish without the possibility of relief or a threat of unendurable pain, such as the prospect of chronic and increasingly painful disease	73	05.14
<i>Altruism</i> : the seeking of death to benefit others, as in the instances of chronic invalids who believe that when they die they will relieve their families of the emotional and financial burdens	28	01.97
<i>Hereditary factors</i> : a high family incidence may be more likely due to imitative behavior or psychological identification than to biological or genetic factors	16	01.12
<i>Psychosocial factors</i> : the chronically depressed individuals, who have "never known a day of happiness" live with an inconsolable disappointment and sadness that makes existence meaningless	37	02.60
<i>Substance abuse</i> : chronic use of alcohol, opium, etc.	97	06.83
Total	1421	100.00

problems that can lead to suicide. The effectiveness of specific suicide-prevention programs, such as teen hotlines, crisis centers, and school education, has not been proven yet, in part due to the small numbers of suicides in a large population base.

There are a few reports on the trends of elderly suicide rates in western countries but not from Asian countries. Kua et al. in a study describing the trends of elderly suicide rates of Chinese, Malays and Indians in Singapore from 1991 to 2000 reported that the suicide rates for the elderly showed a decline from 40.1 per 100,000 in 1990 to 17.8 per 100,000 in 2000.⁵³

Socio-economic disadvantage has direct effects on the person's levels of self-esteem, feelings of hopelessness,

and suicidal behaviors. We observed that suicide was more prevalent in a particular socioeconomic category having low-income and limited resources. It has been reported that the children in families which are exposed to multiple and severe stresses and are unable to provide a supportive environment may respond to stress poorly, impulsively, and, in extreme cases, with suicidal behavior.⁴⁴ According to a study,⁵⁴ the current phenomenon of a differential decrease in female rates is of key interest, and invites speculation. It is likely that such a change reflects improvements in the socioeconomic status of women in Singapore over the last two decades. Educational discrepancies across the sexes have been addressed, while younger women are more likely to be financially independent and aware of their rights under the Women's Charter, less likely to view divorce as stigmatizing and thus less likely to remain in a dysfunctional marriage. Such hypotheses are capable of formal testing and pursuit.

Although suicide commonly is associated with anxiety, depression, and social withdrawal, research suggests a link between violent behaviors directed at oneself (suicidal behaviors) and violent behaviors directed at others among adolescents. Certain students who engage in extreme forms of violence, such as school shootings, exhibit suicidal ideation or behavior before or during the attack.⁵⁵ In some cultures, suicide is permissible in certain situations and can be perceived as normal. For example, in Japan, suicide is sometimes considered an honorable action and is seen as a kind of atonement or a way of taking responsibility. Scandal-tainted politicians and businessmen often make headlines after having committed suicide. According to Takahashi et al.,⁵⁶ the Japanese place a high value on group cohesiveness and cannot tolerate the feeling of being excluded from a group of significant others. Committing suicide is a form of taking responsibility for causing trouble to the organization, whereas in Thailand, it is more common that suicide is done to escape debt, financial problems or being found guilty. Social attitudes toward suicide among Thai people are somewhat arbitrary. According to Theravada Buddhist doctrine, a man cannot avoid suffering by taking his life, nor does he escape from the 'wheel of suffering' by doing so. Suicide is the outcome of a desire to annihilate oneself and the fruit of that act is a rebirth in the woeful planes of existence, and hence further suffering. In general, Thai people regard suicide as a sin or a foolish act. However, results from a qualitative study done in the north of Thailand illustrated that suicide is not a term that is avoided in daily life and it is used as an idiom to express the distress being experienced.⁵⁷

There is paucity of information on suicide from Islamic countries like Pakistan, in which data collection poses formidable challenges. A variety of social, legal, and religious factors make reporting and diagnosing suicide difficult. However, paradoxically, incidents of suicide are regularly reported in newspapers in Pakistan. In the absence of other means these reports serve a useful information source for suicidal deaths. A 2-year analysis of all such reports in a

major newspaper in Pakistan⁵⁸ showed 306 suicides reported from 35 cities. Men (208) outnumbered women by 2:1. While there were more single than married men, the trend was reversed in women. The majority of subjects were under 30 years of age and “domestic problems” was the most common reason stated. More than half the subjects used organophosphate insecticides, while psychotropics and analgesics were used infrequently. The study challenges the widely held belief that suicide is a rare phenomenon in Islamic countries, and underscores the need for more culture specific research on this important public-health problem.

According to a study, suicides in Lithuania have a distinct annual rhythm with peaks in summer and troughs in December.⁵⁹ It has been suggested that seasonal vulnerability is biologically determined and associated with the circannual rhythms of central serotonin neurotransmission.⁶⁰ It has been reported that a combination of hopelessness with aggressive and impulsive behavior, anhedonia is related to low brain serotonin levels and is a predictor of suicide.⁶¹ In recent years, it has been demonstrated that serotonin production and serotonin-related medical and biological events (e.g., severity of migraine attacks, suicide rates, and blood coagulation) are related to environmental physical activity. Several studies have shown that suicide rates are inversely related to cosmophysical (i.e., solar and cosmic-ray) and geomagnetic activity.⁶² Evidences have been provided that violent suicides and suicide attempts are higher among those with presence of depressive disorders while depressed suicides are known to display seasonal variations with peaks occurring in spring and summer.⁶³ However, we could not establish any such factor in our study.

According to the National Crime Records Bureau of India, suicide is among the top ten causes of death in India. Suicide is also among the top three causes of deaths in India between 16 and 35 years age group.⁶⁴ The number of suicides in India, according to a survey, has risen from 40,000 in 1968 to 110,000 in 1999, with the national incidence rate of 11 per 100,000 population per year.⁶⁵ The overall suicide rate in India is not as high as in many other Asian countries but it has a larger effect than that generally perceived because the highest proportion of suicide cases occurs among the most productive sector of the workforce. We found 1212 (85%) cases of suicide in the age group of 16–40 years.

The first step in preventing suicide is to identify and understand the risk factors (anything that increases the likelihood that person will harm himself not necessarily the cause). Research has identified the following risk factors for suicide⁶⁶:

- previous suicide attempt(s),
- history of mental disorders, particularly depression,
- history of alcohol and substance abuse,
- family history of suicide,
- family history of child maltreatment,

- feelings of hopelessness,
- impulsive or aggressive tendencies,
- barriers to accessing mental-health treatment,
- loss (relational, social, work, or financial),
- physical illness,
- easy access to lethal methods,
- unwillingness to seek help because of the stigma attached to mental health and substance abuse disorders or suicidal thoughts,
- cultural and religious beliefs – for instance, the belief that suicide is a noble resolution of a personal dilemma,
- local epidemics of suicide,
- isolation, a feeling of being cut off from other people.

Protective factors buffer people from the risks associated with suicide. A number of protective factors that have been identified include⁶⁶:

- effective clinical care for mental, physical, and substance abuse disorders,
- easy access to a variety of clinical interventions and support for help seeking,
- family and community support,
- support from ongoing medical and mental health care relationships,
- skills in problem solving, conflict resolution, and nonviolent handling of disputes,
- cultural and religious beliefs that discourage suicide and support self-preservation instincts.

5. Conclusion

Despite the high degree of formalization in assessment of unnatural deaths, suicide numbers derived from mortality statistics might generally underestimate the real numbers to a certain extent. Firstly, suicide is very specific cause of death, which may be masked by other causes, such as accidents or undetermined causes of death, due to the sensitivity of society to such a diagnosis. Secondly, the possibility of incomplete counts, since a considerable number of suicide episodes do not result in death cannot be ruled out. Methods of suicide employed generally reflect the availability of methods in the community. Pattern of suicide in a region depends upon variety of factors, ranging from availability and access to the socioeconomic status of the individual as also the prevailing cultural and religious influences. Accordingly, the developing countries need to develop novel strategies that are appropriate to their socioeconomic environments rather than adopting programs developed from Western countries. Suicide prevention efforts in India should focus on control access of agricultural chemicals, provide high-risk individuals with alternative methods in dealing with stress during crisis, conduct research on the risk and protective factors operating in subjects with suicidal behavior, and improving suicide monitoring system. Public health officials should develop intervention strategies that address the challenges

posed by the changing suicide methods, including programs that integrate monitoring systems, etiologic research, and comprehensive prevention activities.

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